Roger Williams University Law Review

Volume 14 | Issue 3 Article 5

Summer 2009

Challenges in the Development and Financing of Offshore Wind Energy

Ed Feo
Milbank Tweed Hadley & McCloy LLP

Josh Ludmir
Milbank Tweed Hadley & McCloy LLP

Challenges in the Development and Financing of Offshore Wind Energy

Ed Feo and Josh Ludmir*

INTRODUCTION

In the race to find viable forms of renewable energy, offshore wind energy presents an attractive option that has been implemented with some success in Europe but remains in the early stages of development in the United States. Offshore wind's appeal stems from the fact that it uses essentially the same technology as onshore wind power, which is already considerably developed and widely deployed around the world, but with some notable advantages. For instance, unlike their onshore counterparts, offshore wind farms generally enjoy stronger and more constant breezes that can generate greater amounts of electricity than is available with onshore wind farms. In addition, since offshore wind turbines are not subject to the same constraints in terms of space, transport of components for assembly, and aesthetics as those onshore, they tend to be larger and more efficient. Another major advantage is that electricity generated by offshore wind is transmitted directly to the coast, where most large population centers are located, and thus does not have to be carried indirectly across long distances from remote areas, as is often the case with onshore wind.

The United States Department of Energy has estimated that more than 900,000 megawatts (MW) of potential wind energy exists off the coasts of the United States.[1] A similarly vast

---

* Milbank Tweed Hadley & McCloy LLP

1. United States Department of the Interior, *Wind Energy Potential on the U.S. Outer Continental Shelf* (2006), *available at* http://ocsenergy.anl.gov/documents/docs/OCS_EIS_WhitePaper_Wind.pdf

resource of potential wind energy exists above the waters off Europe. The European Wind Energy Association (EWEA) has estimated that the offshore wind blowing over less than 5% of the North Sea's surface area could supply roughly 25% of Europe's current electricity needs.[2] Yet despite this great potential, there are no commercial offshore wind farms in operation in the United States at the present time, and in the European Union, offshore wind currently accounts for less than 2% of all installed wind energy capacity.[3]

What is preventing the widespread development of offshore wind energy, and why has it not been able to follow the same impressive growth rate as onshore wind during the last decade? Although no single factor can fully explain this phenomenon, in general, offshore wind energy developers and financiers face technological/operational, economic, and regulatory challenges, which are different or greater than those confronted by onshore wind. These challenges have made it difficult to obtain sufficient capital and support for offshore wind energy development, thus stifling the industry's growth. Until such challenges are overcome or at least dealt with as normal, manageable and necessary risks associated with project development, offshore wind will not be able to realize its full potential as a practicable and economically competitive form of renewable energy.

The first part of this article will examine these challenges individually, and analyze the extent to which they have hindered the development of offshore wind energy generally. The second part will assess the current state of offshore wind energy development in Europe and the United States and how each has grappled with the challenges described in the first part. The article will conclude with an overview of future prospects for offshore wind, and recommendations to further its development.

(last visited June 4, 2009).

2. The European Wind Energy Ass'n, *Current role and future prospects for offshore wind in Europe*, http://www.ewea.org/index.php?id=203 (last visited May 25, 2009).

3. *Id.*

THE CHALLENGES FACING OFFSHORE WIND ENERGY

A. Technological/Operational Challenges

1. Offshore Wind Turbines: Design, Availability, Installation and Maintenance

Offshore wind turbines use the same basic technology as their onshore counterparts and are built by the same manufacturers as well. The majority of turbines installed offshore have the capacity to generate between 2.0-3.6 MW of electricity, more than typical onshore wind turbines.[4] While the capacity of an offshore machine is greater, the cost is higher on both an overall and per kWh basis. The additional cost for offshore turbines is due in part to specialized components, such as reinforced foundations to anchor the machines to the seafloor, as well as anti-corrosive features to help them withstand the damaging effects of the sea air and saltwater.[5]

Given the greater demand for onshore units, and the resulting unavailability of needed raw materials and components, lead times for offshore turbines can be up to 2-3 years,[6] thus making turbine supply a significant challenge to offshore wind energy development. This supply problem is exacerbated by the fact that there are currently only a handful of turbine manufacturers with extensive track records in offshore technology. Among these, the most widely employed are Vestas and Siemens Wind Power. The difficulties posed by this lack of experienced offshore turbine manufacturers were made apparent in 2007, when developers suffered a serious turbine supply shortage since Vestas decided to place a moratorium on the sale and delivery of its offshore unit, the V90-3 MW, due to gearbox problems.[7]

Turbine installation and maintenance also presents a

4. Steve Sawyer, Secretary General, Offshore Wind Council, Address at the Roger Williams University School of Law 7th Marine Law Symposium (Oct. 24, 2008), *Offshore Wind: Pioneering a New Industry*, PowerPoint presentation available at http://law.rwu.edu/sites/marineaffairs/content/pdf/Steve_Sawyer.pdf.

5. *Id.*

6. BVG Assoc. Ltd., *UK Offshore Wind: Moving up a gear* (2007), http://www.bwea.com/pdf/offshore/movingup.pdf.

7. *Id.* at 12.

formidable challenge to offshore wind development. With all the specialized equipment, vessels (such as crane and jack-up ships), and personnel required to erect and maintain wind turbines in the harsh conditions offshore, the initial construction and long term operating costs of offshore wind farms far exceed those of onshore wind farms. These costs increase substantially the farther offshore the turbines are placed and the deeper the water in which their foundations are laid. As with offshore turbines themselves, there is also currently a supply shortage of suitable vessels and trained personnel for turbine, foundation, and undersea electrical cable installation and maintenance that further delays the completion of offshore wind projects, and prevents them from keeping pace with onshore wind project development. Part of this shortage is due to the fact that many of the vessels and personnel are also currently being used by the offshore oil and gas industry, which receives somewhat more preferential treatment by offshore marine construction companies largely because it is a more established industry.[8]

2. Electrical Connection Issues

A major portion of the installation and operating costs of offshore wind farms goes toward the electrical connections both among the turbines within the farm, and from the farm to the electrical grid onshore. Although the cables within the farm are not always buried, the cable from the farm to shore, which can run a distance of anywhere from 8-50km, must be buried beneath the seafloor so as to avoid interference with fishing and shipping.[9] Burying and maintaining this cable requires specialized equipment, vessels, and personnel, which as mentioned above, are costly and in short supply.[10]

Once an offshore wind farm goes online, another major challenge involves the integration of the power it generates into onshore electricity networks to effectively meet demand. Electricity generated by offshore turbines must be upgraded in

---

8. *Id.* at 15.

9. British Wind Energy Ass'n, *Prospects for Offshore Wind Energy, Report to the EU Alterner Contract XVII/4.1030/Z/98-395* (on file with author).

10. BVG Assoc. Ltd., *supra* note 6.

order to be compatible with onshore delivery systems. In addition, wind is an intermittent resource, and often it does not match electricity demand. During periods when the wind happens to be strong, and an offshore farm generates more electricity than is required, the operator of the electricity network may require the wind farm to be curtailed since there is no way of storing it for future use. On the other hand, when the wind happens to be weak, and an offshore farm cannot generate sufficient electricity to meet demand, thermal and hydroelectric plants (primarily since they have stored energy capacity that can be used whenever the need arises) must be available to provide the necessary backup power. As of yet, no offshore grid has been built to interconnect multiple offshore wind farms and decrease reliance on conventional generating plants as sources of backup power. Consequently, the intermittency of wind energy, combined with the costs and burdens of integrating offshore wind generated electricity with the onshore grid is yet another factor that has slowed the widespread development of offshore installations.[11]

3. Environmental and Visual Impact

Although offshore wind turbines themselves do not release pollutants into the air or sea, their installation and operation may pose risks to the marine environment. For instance, the anchoring of the turbines' foundations and undersea cables causes sediment and noise disturbances on the seabed and may result in the loss of habitats for marine life. And when the turbines become operational, the rotation of their blades may pose hazards to migratory birds, and may cause underwater vibrations that can affect fish and marine mammals.[12]

With regard to human activities, offshore wind farms can interfere with navigation instruments, radar and radio, thus posing a potential hazard to shipping and commercial and military air traffic. Fishing is also potentially affected by the presence of wind turbines in areas normally frequented by commercial trawlers.[13]

From an aesthetic point of view, plans for the development of

11. British Wind Energy Ass'n, *supra* note 9, at 16.
12. *Id.* at 26.
13. *Id.*

offshore wind farms have occasionally been met with opposition from coastal residents, who argue that the placement of turbines offshore (even those that are barely visible to the naked eye) is an eyesore that disrupts views of the seascape, thereby hurting property values and local economies. In the United States, the Cape Wind Project, which aims to be the country's first offshore wind farm, has been staunchly opposed for these reasons by many residents of Cape Cod, Massachusetts. The opponents claim that tourism, which is an important industry for Cape Cod and Massachusetts in general, would be negatively impacted by the proposed offshore turbines because they would interfere with views and recreational activities.[14] Aesthetic opposition, such as this, has presented considerable challenges that have significantly delayed the development of offshore wind, especially in the United States.

B. Economic Challenges

1. Cost

Perhaps the greatest challenge that has prevented the widespread development of offshore wind energy is its cost. The costs associated with nearly every aspect of the construction, operation and maintenance of offshore wind farms are significantly higher than the cost of onshore installations. Starting with the turbines themselves, the need to "marinize" the machinery to protect it against offshore conditions can add up to 20% to unit costs.[15] Similarly, the construction and installation of offshore turbines' specialized foundations can account for up to 30% of total turbine costs (and even more in deeper water), while only making up about 7% of the cost of onshore units.[16] The cost of connecting offshore wind farms to onshore electricity networks, which increases the farther offshore the installations are located, accounts for between 17-34% of the total cost. For onshore wind farms, only about 5% of the total cost goes toward network

---

14. Elizabeth Mehren, *Cape Cod Wind Farm Project May Be Headed for Pasture*, L.A. Times, May 5, 2006, *available at* http://articles.latimes.com/2006/may/05/nation/na-wind5 (last visited May 25, 2009).

15. BWEA, British Wind Energy Ass'n, *supra* note 9, at 19.

16. *Id.*

connection.[17] Maintenance also adds a hefty sum to the cost of offshore wind given the harshness of the marine environment (which often prevents or delays required repairs), and the lack of specialized maintenance equipment and personnel. This expense increases with the lost production capacity of an offshore installation which has units that are out of commission and awaiting maintenance.[18] In absolute terms, all these costs translate to an estimated €2,300 per MW installed for offshore wind versus €1,300 per MW installed for onshore wind.[19]

2. Financing

Given offshore wind energy's high capital costs, and the challenge of installation and operation offshore, most of the current offshore projects have been financed by large creditworthy sponsors rather than by banks on a project finance basis. The sponsors have tended mainly to be utility companies because they are more accustomed to handling large-scale construction and operations issues similar to those associated with offshore wind development.[20]

Another factor that has limited the availability of outside debt financing for offshore wind is the unconsolidated nature of the risks and parties involved in the manufacture and installation of offshore turbines. Since there is no single entity that fulfills both of these functions, offshore wind farms have not been built with "wrapped" turnkey engineering, procurement and construction contracts where one party guarantees the contract's performance. Instead, the process is characterized by separate contracts for supply and construction, with the latter being divided further into individual contracts for onshore work, offshore assembly and cable installation.[21] Consequently, the project's risk varies across the different stages of its design and construction based on the individual performance standards of the various contractors involved. Because of this, major lenders and financial institutions

17. *Id.*
18. Ed Feo, *Prospects for offshore wind: Lessons from Europe* (2008), http://www.milbank.com/NR/rdonlyres/7361DF6E-F395-4318-9B56-124FD39B5F01/0/Feo_NACE_MayJun_2008.pdf.
19. *Id.*
20. *Id.*
21. *Id.* at 2.

have not felt comfortable providing debt financing to offshore developers. This has been especially true as of late given the global financial and credit crisis.[22]

C. Regulatory Challenges

Offshore wind development also faces challenges in obtaining regulatory approvals. In Europe, these regulatory challenges have manifested themselves in the need for developers to comply with both the permitting requirements of the country where the project is located and those of the European Union, which are often at odds with each other. Similarly, offshore wind developers in the United States have had to deal with regulatory agencies at the local, state and federal levels which have different and sometimes conflicting permitting schemes. At the federal level, this lack of well-defined regulatory jurisdiction has led to a dispute between two agencies—the Federal Energy Regulatory Commission (FERC) and the Department of the Interior's Minerals Management Service (MMS)—regarding authority over offshore energy projects in the portion of the Outer Continental Shelf (OCS) which lies between 3-12 nautical miles from U.S. shores.[23] The Energy Policy Act of 2005 authorized the MMS to lease property on the OCS for the development of alternative energy projects, including offshore wind farms. At the same time, under the Federal Power Act of 1920,[24] FERC has the authority to license electricity-producing projects located in navigable waters—which includes the waters above the OCS.[25] Although FERC has not used this authority to directly assert jurisdiction over offshore wind projects (after all, the statute only gives it control over hydrokinetic generation projects), the agency's offshore permits and licenses grant other ocean energy developers the exclusive

22. *Id.*

23. Sarah McQuillen Tran, *Why Are Developers Powerless to Develop Ocean Power?* http://www.works.bepress.com/context/sarah_tran/article/1006/type/native/viewcontent (last visited June 2, 2009).

24. Fed. Energy Regulatory Comm'n, licensing home page, http://www.ferc.gov/industries/hydropower/indus-act/order-2002.asp (last visited June 3, 2009).

25. Chuck Sensiba & Julia Wood, *FERC Affirms Jurisdiction over Hydrokinetic Projects on the OCS*, Van Ness Feldman, Oct. 17, 2008, http://www.vnf.com/news-alerts-297.html.

rights to study or develop particular areas in the OCS, which could potentially block the construction of wind farms that have obtained leases from the MMS in the same areas.[26]

On April 9, 2009, the FERC and the MMS signed a Memorandum of Understanding ("MOU") that acknowledges the MMS' exclusive jurisdiction to issue leases on the OCS for all renewable energy projects, including wind and hydrokinetic projects.[27] The MOU also prohibits the FERC from issuing preliminary permits for hydrokinetic projects on the OCS.[28] Nevertheless, there is still uncertainty as to how the division of the FERC's and the MMS' respective jurisdictions over renewable energy projects on the OCS will ultimately work in practice. This regulatory and administrative uncertainty and confusion is one of the principal reasons the Cape Wind Project and other proposed offshore wind projects in the United States have not yet been constructed.

THE CURRENT STATE OF OFFSHORE WIND ENERGY DEVELOPMENT—CONFRONTING THE CHALLENGES

With all the challenges facing offshore wind energy development, it would seem as though prospects for the future of the industry look bleak. Nevertheless, motivated by a lack of space onshore, attractive policy incentives, and increased public support for renewable energy, offshore wind developers in Europe and the United States (in a more limited capacity) are now employing creative ways to overcome or at least mitigate the impact of these challenges. If such progress continues to be made in all the most problematic areas of offshore financing, construction and operation, it will not be long before offshore development catches up with, and perhaps even outpaces, onshore wind energy development.

26. Tran, *supra* note 23, at 13.

27. Carolyn Elefant, *Memorandum of Understanding signed April 9, 2009*, Ocean Renewable Energy Coalition, Apr. 13, 2009, http://www.oceanrenewable.com/2009/04/13/memorandum-of-understanding-signed-april-92009/.

28. *Id.*

A. Europe

Europe is currently the world leader in offshore wind energy, with about 25 projects in its waters that are commercially operational, some of which have been in use since the early 1990's.[29] At present, Denmark, Sweden, the United Kingdom, the Netherlands, Ireland and Germany together have over 1,100 MW of electricity-generating capacity in offshore wind installations in the North, Baltic, and Irish Seas.[30] In light of the European Union's recent commitment to have 20% of its energy generated from renewable sources by 2020,[31] the EWEA estimates that this capacity is likely to increase to 20-40 GW in the next decade or so—especially since individual member states have also set ambitious renewable energy development goals and policies of their own.[32] For instance, in the United Kingdom, the government has placed a Renewables Obligation on electricity suppliers to help achieve its target of having 15% of the country's power generated from renewable sources by 2015.[33] This measure (which is particularly favorable toward offshore wind), combined with substantial government grants and a comprehensive three-round bidding process to award leases to offshore wind developers has led the British Wind Energy Association (BWEA) to forecast the installation of 6.6 GW of offshore wind capacity by 2015. If this prediction is correct, the UK could soon see the most extensive development of offshore wind in the world during the next few years.[34]

---

29. *Id.*

30. The European Wind Energy Ass'n, *supra* note 2.

31. European Parliament, *Resolution on the proposal for a directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources*, documents COM(2008)0019–C6-0046/2008–2008/0016(COD), http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2008-0609+0+DOC+XML+V0//EN&language=EN#BKMD-1 (last visited June 10, 2009).

32. European Wind Energy Ass'n, Delivering *Offshore Wind Power in Europe: Policy Recommendations for Large-Scale Deployment of Offshore Wind Power in Europe by 2020*, http://www.ewea.org/fileadmin/ewea_documents/images/publications/offshore_report/ewea-offshore_report.pdf (last visited June 10, 2009).

33. Int'l Energy Agency, *Offshore Wind Experiences*, http://www.iea.org/Textbase/Papers/2005/offshore.pdf at 13 (last visited June 7, 2009).

34. BVG Assoc Ltd., *supra* note 6.

Other countries, such as Denmark (which was the first in the world to develop a commercial offshore wind farm and currently has the greatest amount of installed offshore capacity) and Germany (which has long supported renewable energy by means of a highly favorable feed-in tariff) have implemented similarly aggressive policy measures and objectives to help stimulate offshore wind development, and both have approved moderate to large-scale projects for construction in the immediate future. Not surprisingly, this increased government backing and support has inspired greater private sector confidence in the offshore wind industry, thus allowing many of the challenges that are currently preventing its growth to gradually be overcome.

1. Reducing the Cost of Turbine Manufacture, Installation and Maintenance

With governments providing the political and economic impetus, as well the necessary assurances to encourage the development of offshore wind in Europe, more players have begun to enter the field, bringing with them new technology, capital and expertise. In turbine manufacturing, Vestas and Siemens still hold a majority share of the market, but now are joined by other companies. REpower, a German company that is majority-owned by Indian wind giant Suzlon, now has 10 MW installed offshore, with 60 MW under construction. Another German company, Multibrid, currently has 30 MW under construction offshore.[35] As these newer companies gain experience, establish their reputations, and increase their production, the scale of turbine manufacturing will begin to resemble that of a more competitive industry as supply will no longer be so drastically outpaced by demand.[36]

The offshore construction and installation industry is also expected to grow, since there will likely be greater (and more profitably compelling) demand for vessels, equipment and trained personnel. Over time, as technology improves, turbine

35. Taylor Roark, Address at the Roger Williams University School of Law 7th Marine Law Symposium (Oct. 24, 2008), *Offshore Wind: An International Perspective*, PowerPoint presentation available at http://law.rwu.edu/sites/marineaffairs/content/pdf/Roark.pdf.

36. Feo, *supra* note 18, at 2.

manufacture, installation and maintenance will become more efficient, not as time consuming, and less costly. Nevertheless, the EWEA predicts that the cost for offshore wind will still remain considerably higher than for onshore wind in the near future because the unique demands of the marine environment will continue to require a more substantial capital investment.[37] As the offshore wind market expands, however, and developers become more confident in the performance of their projects, they will likely shift their focus from trying to reduce the required initial capital investment to recouping that initial investment and ultimately earning a profit from increased generation-based revenues.[38] This approach will lead to greater interest in the deployment of turbines with more extensive generating capacities (as is already being seen in the "Beatrice" demonstration project 25km off the eastern coast of Scotland, which employs two 5 MW REpower turbines,[39] and the C-Power project off Belgium, which employs six such units),[40] in larger numbers, and farther offshore where the wind is stronger and more constant. Or at the very least, more resources will be spent on the siting and wind data-gathering phases of future projects in order to ensure that the location of the wind farm will yield the maximum output.[41]

2. Facilitating the Debt Financing of Offshore Wind Projects

Along with the growth and technological innovation that is being seen in the offshore turbine manufacturing and installation industries, the financing of offshore wind development has been improved with the successful non-recourse debt financings of offshore projects in the Netherlands and Belgium. The Dutch project, "Q7" (now "Princess Amalia"), is a 120 MW installation that was financed by Dexia and Rabobank in 2006. The Belgian project, "C-Power," is a 30 MW installation that was principally

---

37. *Id.*
38. *Id.*
39. Five Megawatt Turbine Installed Offshore (September 1, 2006), http://www.renewableenergyworld.com/rea/news/story?id=45877 (last visited June 2, 2009).
40. Jérôme Guillet, *Offshore Wind: Options for non-recourse financing*, http://www.aspo-spain.org/aspo7/presentations/Guillet-Wind-ASPO7.pdf (last visited June 2, 2009).
41. Feo, *supra* note 18.

financed by Dexia, with Rabobank providing mezzanine debt.[42] Both projects were unique in that they employed novel and creative contractual devices that reduced the banks' exposure to risk, and allowed them to lend to the developers with greater confidence and security.[43]

The projects' construction risk was mitigated by the lenders accepting the multiple contract and party scheme mentioned previously in exchange for all the contractors entering into an interface agreement, which covered in detail the overall schedule, interaction among the contractors, hand-off procedures, and the consequences of delays by one contractor on the other contracts.[44] This was supplemented with extensive due diligence by the lenders' independent engineers on delays in the contract schedule and increased costs.[45] As further support for possible delays and additional unforeseen construction costs, the lenders required the availability of a substantial contingent facility funded by a combination of debt and equity.[46]

Another security device incorporated by the lenders into their agreement with the developers was a "cash sweep" mechanism. This allowed the lenders to be repaid faster by giving them the ability to immediately take a portion of the surplus revenues earned to reimburse the loans if the projects were successful or at least performed slightly better than expected. As a result, the banks were exposed to risk over a shorter period of time.[47]

To reduce the long-term operating risk associated with offshore wind turbines, the lenders obtained specialized warranties from the manufacturers guaranteeing the turbines' performance. Given the harsh conditions in which offshore turbines operate, these warranties were for a longer duration than those normally provided in onshore wind projects and contained a unique penalty scheme for the manufacturers.[48] Penalties would

---

42. *Id.*
43. *Id.*
44. *Id.*
45. *Id.*
46. Jérôme à Paris, *The First Ever Off-Shore Wind Farm Financed by Banks...*, The Oil Drum, Oct. 31, 2006, http://www.theoildrum.com/story/2006/10/30/231713/57.
47. *Id.*
48. Feo, *supra* note 18.

only be assessed against the turbine manufacturers if the turbines' performance were severely degraded. On the other hand, the manufacturers would receive bonuses if the turbines performed better than expected.[49] This scheme allowed the warranties to be sustainable for a longer period of time because the manufacturers had the benefit of being able to bear less financial risk for modest performance degradations, while having to take on heavier risk for more significant shortcomings.[50]

In addition to these contract devices, the developers were able to get previously unobtainable insurance coverage for a fairly comprehensive set of events, which gave the lenders yet another reason to feel confident about providing them with debt financing.[51] The success of the "Princess Amalia" and "C-Power" debt financings helped to discredit the formerly held belief that offshore wind projects could only be funded by utility companies with strong balance sheets. This, in turn, provided the opportunity for a greater number and variety of developers to enter the field and expand both the scale and competitiveness of the offshore wind industry.

3. Electrical Connection and Regulatory Improvements

As discussed above, there is currently no offshore grid in existence which can harness the power generated by multiple offshore wind farms in various countries and effectively direct it to where demand is highest. Recently, however, the EWEA and EU have proposed building such a grid in the North Sea, and individual countries such as the UK and Germany are now considering plans to upgrade their respective onshore electrical networks to better accommodate larger levels of power generated by offshore wind in the near future. The costs of such upgrades would most likely be passed on to grid operators and ultimately, consumers.[52]

Similar to the electrical network connection issue, the permitting and regulatory approval process for offshore wind has not yet been fully streamlined either within the Member States

49. Paris, *supra* note 46.
50. Feo, *supra* note 18.
51. Paris, *supra* note 46.
52. European Wind Energy Ass'n, *supra* note 2 at 22.

themselves or between them and the EU. The EWEA has proposed that the EU adopt a "one-stop shop office" approach to centralize matters related to the planning and development of offshore wind.[53] This issue will likely be considered in greater detail as the Member States decide how to actually implement the commitment to generating 20% of all their energy from renewables by 2020.[54]

One particular aspect of the permitting and regulatory approval process that has been successfully standardized involves environmental impact assessments of prospective offshore sites. Under EU-SEA Directive 2001/42/EC, all developers are required to prepare a Strategic Environmental Assessment (SEA) report at the earliest stages of a project's development to be submitted for approval to the relevant Member State's environmental authorities and the public.[55] This formal process has helped assuage concerns about the possible negative impacts of offshore wind farms on the marine environment,[56] and may have even contributed to the European public's more favorable aesthetic impression of offshore turbines. In Denmark, for example, offshore wind farms are now considered landmark tourist attractions worthy of admiration for their unique design and engineering.[57]

B. The United States

1. Current Offshore Wind Development Initiatives

Unlike Europe, no offshore wind project has commenced construction in the United States. Europe has been ahead of the United States in the development of wind energy generally, and

---

53. *Id.* at 15.

54. *Id.*

55. TOUR TO MIDDELGRUNDEN OFFSHORE WIND FARM, THURSDAY JULY 10, AT 15.00, *available at* http://www.middelgrunden.dk/MG_UK/news/10%20juli%20d.pdf.

56. Extensive studies at numerous sites have revealed no significant bird impacts, and turbine foundations have been shown to act as artificial reefs, which can help sustain marine life. As for the noise and vibration caused by the rotor, the impacts have been shown to be minimal as many species of marine animals cannot even hear it. http://www.awea.org/faq/wwt_offshore.html.

57. TOUR TO MIDDELGRUNDEN OFFSHORE WIND FARM, *supra* note 55.

has had more land use constraints than the United States, which meant that the push offshore naturally had to occur first in Europe. The United States has been behind Europe in the formulation of a comprehensive regulatory scheme for offshore wind, with the Energy Policy Act of 2005 being the first time that development of offshore wind facilities was addressed at the federal level. Nevertheless, several states have already begun laying the groundwork for extensive offshore wind development by setting ambitious policy goals and offering generous economic incentives for renewable energy generation, and actively seeking project proposals from offshore developers. In Delaware, the nation's first offshore power purchase agreement was signed in 2007 between developer Bluewater Wind and the Delmarva Power utility company.[58] This agreement followed the passage of a state Renewable Portfolio Standard (RPS) requiring that 20% of Delaware's electricity come from renewable sources by 2019.[59] The project, which will have a generating capacity of 450 MW,[60] is expected to be built and supplying Delmarva Power with 16% of its electricity by 2012.[61]

Rhode Island has also begun the process of developing its own offshore wind farm. State lawmakers recently selected developer Deepwater Wind to build a 100-turbine project off of Block Island in Narrangansett Bay. With financial backing from D.E. Shaw & Co., Ospraie Management and First Wind, construction of the installation is set to begin in late 2010, and upon completion, the project is expected to generate up to 15% of Rhode Island's electricity.[62]

In late 2008, the New Jersey Board of Public Utilities selected

---

58. Steve Gelsi, *Green-collar pioneers eye offshore wind riches*, Market Watch, Oct. 8, 2008, http://www.marketwatch.com/story/story/print?guid=EF09C51D-AC5A-4306-8F7A-B736425C107D

59. Bluewater Wind, home Page, http://bluewaterwind.com/de_overview.htm (last visited May 25, 2009).

60. *Id.*

61. Paul Courson, *Wind farm to be built off Delaware shore*, CNN.com, July 15, 2008 http://www.cnn.com/2008/TECH/06/23/wind.turbines/index.html (last visited June 2, 2009).

62. United Press Int'l, *Rhode Island may have first offshore wind*, Jan. 12, 2009, http://www.upi.com/Energy_Resources/2009/01/12/Rhode-Island-may-have-first-offshore-wind/UPI-34161231779319/ (last visited June 10, 2009).

Garden State Offshore Energy, a joint venture between utility Public Service Enterprise Group and Deepwater Wind, to build a 350 MW wind farm off of Atlantic City. The project is set to be completed by 2012, and will be able to generate up to 1% of the state's electricity. Similar to Delaware, this initiative comes on the heels of New Jersey's recently passed RPS, which requires that 20% of the state's electricity come from renewable sources by 2020.[63] In addition, the state passed a law in 2007 calling for the reduction of greenhouse gases to 1990 levels by 2020, which provides further impetus for the development of offshore wind projects such as this one.[64]

2. The Cape Wind Project

Despite all the latest activity in offshore wind development that has been seen in Delaware, Rhode Island and New Jersey, those states were by no means the first in the United States to consider building offshore wind farms. Plans to build the Cape Wind project in Massachusetts were first made public in 2001. Nevertheless, the project's development has been constantly delayed since a group of local residents backed by Senator Ted Kennedy (among others) publicly opposed it due mainly to aesthetic and purported environmental and navigational concerns. In 2007, the group filed a lawsuit challenging the state's decision to issue a final environmental report on the project, and a judge refused to dismiss the suit. Later that year, the Cape Cod Commission rejected approval for the wind farm on procedural grounds. The developer later sought to overturn that decision with the state Energy Facilities Siting Board, but the Board is still reviewing that request. Between January and December 2008, the MMS, the United States Fish and Wildlife Service, and the Coast Guard all issued reports or statements finding that the Cape Wind project would have little or no negative impact on the

63. Craig Rubens, *Deepwater Utility Group Wins New Jersey Offshore Wind Bid*, earth2tech, Oct. 3, 2008, http://earth2tech.com/2008/10/03/deepwater-utility-group-wins-new-jersey-offshore-wind-bid/ (last visited May 25, 2009).

64. New Jersey Seeks Public Input on Plan to Cut Greenhouse Gases, Philadephia News, Dec. 18, 2008, http://www.nbcphiladelphia.com/news/green/New_Jersey_Seeks_Public_Input_on_Plan_to_Cut_Greenhouse_Gases.html (last visited May 25, 2009).

environment or navigation. United States Representative James Oberstar, D-Minn., however, delayed the process once again by asking for more time to consider these issues before release of the final MMS report. It was not until January 16, 2009 that the MMS was able to issue its final report, in which it confirmed that the project would have minimal impact on the environment. But it remains unclear when the MMS will issue its decision on whether to actually grant an approved lease to the project.[65] It is hoped that the Obama administration will help speed this process given the President's stated commitment to promoting renewable energy development in the United States, which he repeatedly addressed during his campaign.

While the Cape Wind project was the first announced offshore wind project in the United States, the considerable regulatory and court challenges to it have hampered its development and left the door open for another project to be the first to commence construction. However, Cape Wind in effect provided the forum for the debate on a number of regulatory issues affecting offshore wind in the United States. As a result, other developers are currently reaping the benefits of the time and expense involved in the development process of the Cape Wind project.

3. Moving Forward

Whether offshore wind projects in the United States will have the same level of success as in Europe is questionable. The United States has a significant offshore wind resource potential, but it also has vast onshore resources that can be accessed more cheaply. Unlike Europe, the United States benefits from the Great Plains, where the wind resource is ample and the population density low. Nonetheless, there are regions of the country, such as the Northeast, where land for onshore wind is difficult to obtain and transmission constraints favor more localized development. Hence the interest in states such as Delaware, Rhode Island and New Jersey in offshore wind.

---

65. Patrick Cassidy, *Report Big Win for Cape Cod Wind Farm*, Cape Cod Times, Jan. 17, 2009, *available at* http://www.capecodonline.com/apps/pbcs.dll/article?AID=/20090117/NEWS/901170316/-1/SPECIAL01.

FUTURE PROSPECTS

Although development of offshore wind energy has grown significantly over the last decade, the industry is still small in comparison to the total amount of installed wind energy capacity globally. Offshore wind energy is projected by the EWEA to be an ever greater share of the wind energy sector in Europe. In the United States, offshore wind will play a visible role in the Northeast but may, for cost and other reasons, find it difficult to compete in other regions of the country. Advances in turbine technology and construction and installation techniques will make offshore wind more efficient and less expensive, potentially expanding its range. As more offshore projects are pursued, the regulatory regime governing them will be more clearly delineated and organized, which will result in more project certainty as well as lower cost.